

What is claimed is:

1. A torque limiting tool comprising:
an inner handle comprising a tool coupling portion and at least one radially oriented slot;
5 at least one interface member located in the radially oriented slot, the interface member comprising an elongated surface generally oriented along a longitudinal axis of the inner handle;
a biasing assembly located in a biasing assembly aperture that provides a longitudinal biasing force to bias the interface member radially
10 outward; and
an outer handle having an inner surface limiting radial displacement of the interface member.
2. The tool of claim 1 wherein the tool coupling portion
15 comprises a tool receiving aperture extending along the longitudinal axis of the inner handle.
3. The tool of claim 1 wherein the tool coupling portion comprises an outer surface of the inner handle.
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4. The tool of claim 1 comprising a plurality of tools each adapted to releasably engage with the tool coupling portion.
5. The tool of claim 1 wherein the biasing assembly aperture is
25 connected to the radially oriented slot.
6. The tool of claim 1 wherein a proximal end of the biasing assembly aperture comprises a threaded portion.

7. The tool of claim 1 wherein the radially oriented slots
comprise at least one angled surface.

8. The tool of claim 1 wherein the interface member comprises
5 at least one surface oriented toward the biasing assembly aperture at an acute
angle with respect to the longitudinal axis.

9. The tool of claim 1 wherein the elongated surface of the
interface member is generally flush with an outer surface of the inner handle
10 when the longitudinal biasing force is removed.

10. The tool of claim 1 wherein the biasing force displaces the
elongated surface of the interface member above an outer surface of the inner
handle.

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11. The tool of claim 1 wherein the elongated surface is at least
about 0.5 inches long.

12. The tool of claim 1 wherein the elongated surface is about
20 1.0 inch long.

13. The tool of claim 1 wherein the elongated surface comprises
a curvilinear shape.

14. The tool of claim 1 wherein the elongated surface comprises
25 a planar portion.

15. The tool of claim 1 wherein the biasing assembly comprises
a spring.

16. The tool of claim 1 wherein the longitudinal biasing force is adjustable.

5 17. The tool of claim 1 wherein the biasing assembly comprises:

a biasing member comprising a leading edge engaged with the interface member;

10 a retainer engaged with the proximal end of the inner handle; and
a spring compressively interposed between the biasing member and the retainer.

18. The tool of claim 16 wherein the leading edge of the biasing member form an acute angled with respect to the longitudinal axis.

15 19. The tool of claim 16 wherein the biasing member is slidably engaged with the biasing assembly aperture.

20 20. The tool of claim 16 wherein the retainer is threadably engaged with a proximal end of the inner handle.

21. The tool of claim 16 wherein the location of the retainer relative to a proximal end of the inner handles is adjustable.

25 22. The tool of claim 1 wherein the inner surface of the outer handle comprises a plurality of detents.

23. The tool of claim 1 wherein the inner surface of the outer handle comprises a curvilinear surface.

24. The tool of claim 1 wherein the inner surface of the outer handle comprises a generally smooth surface.

5 25. The tool of claim 1 wherein the inner surface of the outer handle comprises an asymmetrical structure.

26. The tool of claim 1 wherein the outer handle substantially surrounds the inner handle.

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27. The tool of claim 1 wherein the interface member is displaced radially inward when a torque applied to the tool coupling portion exceeds a threshold value.

15 28. The tool of claim 1 wherein the inner handle rotates within the outer handle when a torque applied to the tool coupling portion exceeds a threshold value.

29. The tool of claim 28 wherein the rotation of the inner
20 handle relative to the outer handle is bi-directional.

30. The tool of claim 1 wherein a torque applied to the inner handle in a first direction that exceeds a threshold value causes the inner handle to rotate in the first direction within the outer handle, and a torque applied to the
25 inner handle in a second direction that exceeds the threshold value does not substantially rotate the inner handle within the outer handle.

31. The tool of claim 1 comprising:

an elongated outer handle having a primary opening to a central aperture adapted to receive the inner handle; and
a cap adapted to retain the inner handle in the outer handle.

5 32. The tool of claim 1 wherein one or more of the inner handle, the outer handle and the interface members comprises metal, ceramic, polymeric materials, a composite, or a combination thereof.

 33. The tool of claim 1 wherein the biasing assembly is located
10 in a biasing assembly aperture.

 34. The tool of claim 33 wherein the biasing assembly aperture is located in the inner handle.

15 35. A torque limiting tool comprising:
 an inner handle comprising a tool coupling portion and at least one radially oriented slot;
 at least one interface member located in the radially oriented slot, the interface member comprising an elongated surface generally oriented along a
20 longitudinal axis of the inner handle;
 a biasing means located in a biasing assembly aperture for providing a longitudinal biasing force to bias the interface member radially outward; and
 an outer handle having an inner surface limiting radial
25 displacement of the interface member.

 36. An adjustable torque limiting tool comprising:
 an inner handle comprising a tool coupling portion at a distal end and a biasing assembly aperture at a proximal end, the inner handle including at

least one radially oriented slot located between the biasing assembly aperture and the distal end;

at least one interface member located in the radially oriented slot, the interface member comprising an elongated surface generally oriented along a longitudinal axis;

a biasing assembly located in the biasing assembly aperture providing a longitudinal biasing force that biases the interface member radially outward; and

an outer handle having an inner surface limiting radial displacement of the interface member.

37. A method of limiting torque transmission comprising the steps of:

generating a longitudinal biasing force along a longitudinal axis of an inner handle;

coupling the longitudinal biasing force to one or more interface members, the longitudinal biasing force biasing a longitudinally oriented elongated surface on the interface members radially outward;

restraining the radial movement of the interface members in an outer handle surrounding at least a portion of the inner handle; and

permitting the inner handle to rotate relative to the outer handle when a torque applied to the inner handle exceeds a threshold level.

38. The method of claim 37 comprising coupling one of a plurality of tools to the inner handle.

39. The method of claim 37 comprising adjusting the longitudinal biasing force.

40. The method of claim 37 comprising displacing the elongated surface above an outer surface of the inner handle.

5 41. The method of claim 37 comprising displacing the interface member radially inward when a torque applied to the inner handle exceeds a threshold value.

42. The method of claim 37 comprising rotating the inner handle within the outer handle when a torque applied to the inner handle exceeds
10 a threshold value.

43. The method of claim 42 wherein the rotation of the inner handle relative to the outer handle is bi-directional.

15 44. The method of claim 37 comprising the steps of:
applying a torque to the inner handle in a first direction that exceeds a threshold value so that the inner handle rotates within the outer handle in the first direction; and

applying a torque to the inner handle in a second direction that
20 exceeds the threshold value without permitting the inner handle to substantially rotate in the second direction within the outer handle.

45. The method of claim 37 comprising the step of:
removing a spring that provides the longitudinal biasing force from
25 the inner handle; and
inserting a different spring having a different spring constant into the inner handle.